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Case Report

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Anterior diastema closure with direct composite resin: three case reports

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ABSTRACT

Anterior maxillary and mandibular diastemas are common aesthetic concerns reported by patients. The treatment of these diastemas involves various approaches, including surgical interventions, orthodontic applications, restorative procedures, or a combination of these methods. Achieving successful outcomes requires careful consideration of the appropriate technique and material selection, along with time constraints, physical and psychological factors, and economic limitations. In diastema cases, direct composite resins offer both clinicians and patients the ability to effectively manage these challenges, facilitating the creation of a natural smile. This case report presents the treatment of three individuals with anterior diastemas. The diastemas were successfully managed in a single session using direct composite resin restorations without the need for tooth preparation.

Keywords: Diastema closure, direct anterior restorations, adhesion, aesthetic

INTRODUCTION

Diastema is a dental anomaly characterized by gaps in the interdental region and the absence of contact points. It is often considered an aesthetic or malocclusion issue, making its closure a common practice in cosmetic dentistry.[1,2] However, not all diastemas require correction. Decisions regarding diastema closure depend on various factors, including the etiology of the problem, the patient's economic status, time, and the patient's preferences. Several treatment methods can be used for diastema closure. Explaining different treatment options to the patient is crucial for achieving a successful outcome and ensuring the patient's consent and cooperation. Depending on the etiological factors, different treatments such as surgery, orthodontics, restorative procedures, or a combination of these may be applied.[1,3,4] By considering the patient's needs, requests, and expectations during the treatment planning process, patient satisfaction with the treatment outcomes can be ensured.[5]

The factors that can cause diastemas are multifactorial and can be listed as follows:[4,6]

- Genetic or racial characteristics
- Labial frenulum
- Imbalanced muscle function
- Dental and jaw malocclusions
- Dental pathologies (microdontia, mesiodens, conical lateral incisors, lateral incisor agenesis, cysts in the midline region)
- Harmful habits (thumb sucking, tongue thrusting, and lip sucking)
- Anomalies in the shape, size, and number of teeth
- Tooth loss
- Physiological or pathological tooth movements
- Maxillary incisor proclusion

Orthodontic treatments are generally recommended for closing diastemas, but in some patients, diastemas may persist after treatment due to changes in dental proportions. Additionally, orthodontic treatments can be expensive and time-consuming. Faster treatments are associated with restorative procedures such as ceramic veneers and composites.[3,7]

Ceramics, despite their aesthetic properties, are generally more expensive than composite resins because they require multiple sessions and laboratory stages. On the other hand, direct composite restorations can be completed in a single session, are easily repaired, and possess both functional and aesthetic properties, making them a preferred choice.[8] Additionally, the rapid advancement of adhesive technology has made composites applicable with minimal or non-invasive approaches, requiring little or no preparation, further enhancing their appeal.[3,7,9]

CASE PRESENTATIONS

Three patients, two of whom were female, presented to the Restorative Dentistry Clinic of the Faculty of Dentistry at Dicle University with complaints of diastema in their anterior teeth. A detailed medical history evaluation revealed no systemic disorders in the patients. Clinical oral examination and radiographic evaluations revealed no evidence of dental caries, and the periodontal tissues were found to be healthy.

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The patients were provided with detailed information about the options for closing the diastema. The advantages and disadvantages of composite restorations were explained, and the patients' socioeconomic status, age, preferences, and expectations were considered. As a result, it was decided to treat the teeth with direct composite restorations as a more protective, economical, aesthetic, and quick option. Detailed information was provided before the interventional procedures, and informed consent forms were obtained from the patients.

Before isolation, color selection was made using the manufacturer's color scale in daylight. The total etching method was preferred to achieve high bond strength. A 37% phosphoric acid (Scotchbond; 3M ESPE) was applied to the surfaces of the teeth to be restored for 30 seconds, followed by rinsing for 30 seconds and drying.

Transparent tape was placed on the mesial and distal surfaces of the teeth to cover the gingival sulcus. Then, a bonding agent (Tokuyama Universal Bond, Japan) was applied using a brush. Light air was applied to create a thin layer of bonding material. The material was polymerized using an LED light source (LED E Plus polymerization filling device) for 10 seconds. Composite resin material [A2, A3 Tokuyama Estelite Σ Quick (Tokyo, Japan)] was placed on the prepared tooth surfaces using a layering technique and exposed to LED light for 20 seconds. After polymerization, the transparent tape was removed and occlusion was checked. Excess material around the cavity margins was removed using micro-granulated flame-tipped burs. The contours of the gingival margins were adjusted, and the finishing process was completed using discs and polishing rubber cups. Patients were informed about the precautions to be taken after treatment and advised to return for follow-up visits at six-month and one-year intervals.

CASE 1

A 35-year-old female patient presented to our clinic with discomfort caused by diastema in her maxillary anterior teeth (**Figure 1**).

Figure 1. Initial photographs of case 1

As treatment, it was decided to apply the direct composite resin technique, a minimally invasive method, to the teeth as described above. After polishing the teeth, the total acid etching procedure was performed without any preparation. Following the bonding process, the teeth were shaped to match their natural form using composite resin [A2 Tokuyama Estelite Σ Quick (Tokyo, Japan)]. As a result, a smile aesthetic that met the patient's expectations was achieved (**Figure 2**).

Figure 2. Final photographs of case 1

CASE 2

A 34-year-old male patient presented to our clinic with aesthetic complaints due to diastemas in his maxillary anterior teeth. Examination revealed diastemas between the central and lateral teeth (**Figure 3**). The patient's periodontal health was found to be good, with normal vertical and horizontal occlusion.

As in Case 1, treatment options were explained to the patient, and a joint decision was made with the patient to apply restorative treatment using the direct composite resin technique in a way that would cause the least damage to the teeth. Following polishing, the total acid etching procedure was performed without any additional preparation. After bonding, the teeth were shaped into their natural form using composite resin [A2 Tokuyama Estelite Σ Quick (Tokyo, Japan)], resulting in a satisfactory aesthetic smile for the patient (**Figure 4**).

CASE 3

A 30-year-old female patient presented to our clinic with aesthetic complaints due to a diastema in the mandibular anterior region (**Figure 5**). After the treatments done in cases 1 and 2, we finished the restoration using composite resin material [A3 Tokuyama Estelite Σ Quick (Tokyo, Japan)] (**Figure 6**).

Figure 3. Initial photographs of case 2

Figure 4. Final photographs of case 2

CASE 3

A 30-year-old female patient presented to our clinic with aesthetic complaints due to a diastema in the mandibular anterior region (**Figure 5**). After the treatments done in cases 1 and 2, we finished the restoration using composite resin material [A3 Tokuyama Estelite Σ Quick (Tokyo, Japan)] (**Figure 6**).

Figure 5. Initial photographs of case 3

Figure 6. Final photographs of case 3

DISCUSSION

The most suitable options recommended for closing diastemas include orthodontics, operative dentistry, and prosthetic applications. Orthodontic treatments require the use of fixed appliances, which entails a more complex, lengthy, and costly treatment process. Prosthetic dentistry, on the other hand, involves indirect and more invasive procedures that require laboratory participation.[10] At the same time, prosthetic methods preferred to correct aesthetic problems, especially to correct color, shape, and position defects in anterior teeth, may cause excessive tooth reduction, which can damage tooth structure and periodontium.[2]

Direct composite restorations offer numerous advantages, including the ability to be applied in a single session, no need for additional laboratory procedures, and features not available in other potential treatment options such as ceramic veneers and orthodontic treatment. Additionally, their ability to be repaired more easily and at a lower cost compared to

porcelain alternatives in the event of unexpected fracture, and the absence of time-consuming repair or reconstruction procedures, are significant advantages.[6] However, direct composite restorations have some disadvantages compared to indirect porcelain alternatives. Most composite materials are not ideally suited for high-stress areas due to their lower fracture resistance and lower pressure resistance in certain clinical situations.[11]

The presence of uncontrolled parafunctional forces, such as bruxism, Class III edge-to-edge occlusion, or nail-biting, can potentially compromise the longevity of direct composite restorations. Additionally, the color stability of direct composite restorations is not as inert as polished ceramics; however, the outcome depends on the quality of finishing and polishing procedures and can be prevented with proper controls.

Despite the disadvantages of direct composite restorations, advancing adhesive techniques and higher-quality composite materials are providing dentists with the opportunity to create more protective, functional, aesthetic, economical, and long-lasting restorations in a very short time.[12]

The presence of diastemas is one of the important factors that can lead to interdental papilla deficiency.[13] One of the main challenges encountered in restorative procedures aimed at closing diastemas is the inability to prevent the formation of wide gingival embrasures, often referred to as the "black triangle."[14]

Studies have indicated that the distance between the contact point created during diastema closure treatment and the height of the alveolar bone crest directly affects interdental papilla formation. It has been reported that papilla formation was observed in nearly all cases when the distance was 5.0 mm or shorter. However, when this distance increases to 6.0 mm, the papilla formation rate drops to 56%, and when it reaches 7.0 mm, it decreases to 27%. These findings emphasize the importance of positioning the contact point in a manner that supports papilla development during restorative procedures.[15]

Direct composite restorations are a preferred treatment option for both dentists and patients due to their minimal invasiveness, quick application, and aesthetic success.[16] A successful treatment approach requires consideration of numerous limiting factors, including time, individual characteristics, psychological status, and economic conditions. Direct composite resins used in diastema cases allow for the controlled management of these limitations while enabling the achievement of natural smile aesthetics.

Additionally, if vital whitening treatment has been applied to the patient prior to diastema closure to achieve an effective smile aesthetic, it is recommended that the composite resin application be performed two weeks after the whitening procedure to ensure optimal bonding. Studies have shown that the bonding strength of restorations decreases by 25-60% following tooth whitening procedures.[17]

Limitations

As a limitation, the absence of long-term clinical follow-up restricts the ability to evaluate restoration longevity and color stability over time.

CONCLUSION

Diastema is a condition characterized by interdental spaces commonly seen in the front teeth, which can affect an individual's aesthetic appearance and oral functions. Various treatment options are available for the effective management of this condition, and the advantages and limitations of each approach should be carefully evaluated. The key to achieving clinical success lies in establishing the most appropriate treatment plan tailored to the patient, alongside an accurate diagnosis. In this context, personalized treatment approaches play a significant role in meeting aesthetic expectations while also facilitating functional improvements.

In cases where esthetic demand, limited time, and a minimally invasive approach are priorities, direct composite restoration can be considered a first-line treatment option for diastema closure.

ETHICAL DECLARATIONS

Informed Consent

All patients signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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